NEC

CLASS A, 1.3 GHz, 12 VOLT POWER TRANSISTOR

NEL130681-12
NEL132081-12

FEATURES

- **HIGH LINEAR POWER AND GAIN:**
  NEL1306: P_{1dB} = 38 dBm, G_{1dB} = 7.5 dB TYP
  NEL1320: P_{1dB} = 43 dBm, G_{1dB} = 6 dB TYP
- **Pt-Si/Ti/Pt/Au METALLIZATION SYSTEM**
- **EMITTER BALLASTING**
- **SILICON NITRIDE PASSIVATION**
- **13.5 V OPERATION**

DESCRIPTION

NEC's NEL1300 series of NPN epitaxial microwave power transistor is designed specifically for large volume mobile and base station applications in the 1300 MHz band. The series is available in a low cost metal-ceramic stripline package offering power levels of 6 watts and 20 watts. The series is designed for linear amplifier applications and is compatible with single sideband and other popular modulation modes.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

PART NUMBER EIAJ[1] REGISTERED NUMBER PACKAGE OUTLINE			NEL130681-12 2SC3541 81			NEL132081-12 2SC3542 81		
SYMBOLS	**PARAMETERS AND CONDITIONS**	**UNITS**	**MIN**	**TYP**	**MAX**	**MIN**	**TYP**	**MAX**
P_{OUT}	Output Power at V_{CC} = 13.5 V, f = 1.3 GHz, P_{IN} = 30 dBm, I_Q = 30 mA, P_{IN} = 36 dBm, I_Q= 150 mA	dBm dBm	36.5	37.5		 41	 42	
η_C	Collector Efficiency at V_{CC} = 13.5 V, f = 1.3 GHz, P_{IN} = 30 dBm, I_Q = 30mA P_{IN} = 36 dBm, I_Q = 150 mA	% %	45	55		 50	 60	
P_{1dB}	Output Power at 1dB Compression Point at V_{CE} = 13.5 V, f = 1.3 GHz	dBm		38			43	
G_{1dB}	Gain at 1dB Compression Point at V_{CE} = 13.5 V, f = 1.3 GHz	dB		7.5			6	
BV_{CBO}	Collector to Base Breakdown Voltage at I_E = 0 I_C = 1 mA I_C = 2 mA	 V V	35			 35		
BV_{CEO}	Collector to Emitter Breakdown Voltage at I_B = 0 I_C = 10 mA I_C = 20 mA	 V V	18			 18		
BV_{EBO}	Emitter to Base Breakdown Voltage at I_C = 0 I_E = 1 mA I_E = 2 mA	 V V	3			 3		
I_{CBO}	Collector Cutoff Current at V_{CB} = 20 V, I_E = 0	mA			0.15			0.5
I_{EBO}	Emitter Cutoff Current at V_{EB} = 2 V, I_C = 0	mA			0.15			0.5
h_{FE}	DC Forward Current Gain at V_{CE} = 10 V (pulsed) I_C = 0.3 A I_C = 0.5 A		20	60	200	 20	 60	 200
C_{OB}	Output Capacitance[2] at V_{CB} = 10 V, I_E = 0, f = 1 MHz	pF		15	20		50	60
P_T	Total Power Dissipation (T_C = 25°C)	W		19.5			50	

Note:
1. Electronic Industrial Association of Japan.
2. Emitter and flange are grounded.

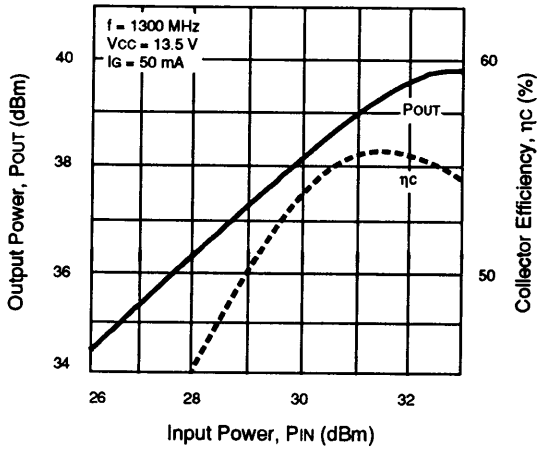
ABSOLUTE MAXIMUM RATINGS[1] (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V_{CBO}	Collector to Base Voltage	V	35
V_{CEO}	Collector to Emitter Voltage	V	18
V_{EBO}	Emitter to Base Voltage	V	3
I_C	Collector Current NEL130681-12 NEL132081-12	 A A	 2 6
$R_{TH(J-C)}$	Thermal Resistance (Junction to Case) NEL130681-12 NEL132081-12	 °C/W °C/W	 10 4
T_J	Junction Temperature	°C	200
T_{STG}	Storage Temperature	°C	-65 to +150

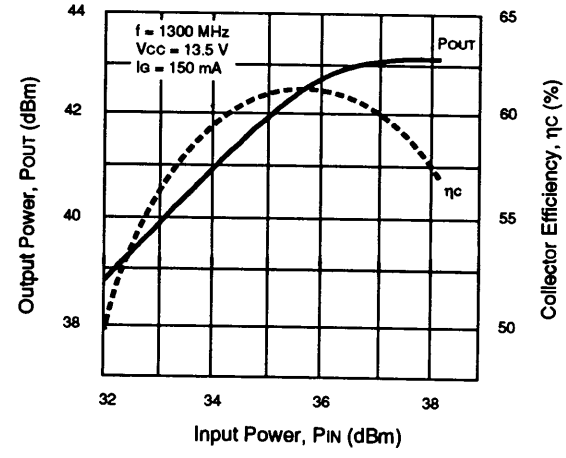
Notes:
1. Operation in excess of any one of these parameters may result in permanent damage.

TYPICAL PERFORMANCE CURVES (T_A = 25°C)

NEL130681-12
OUTPUT POWER AND COLLECTOR EFFICIENCY vs. INPUT POWER

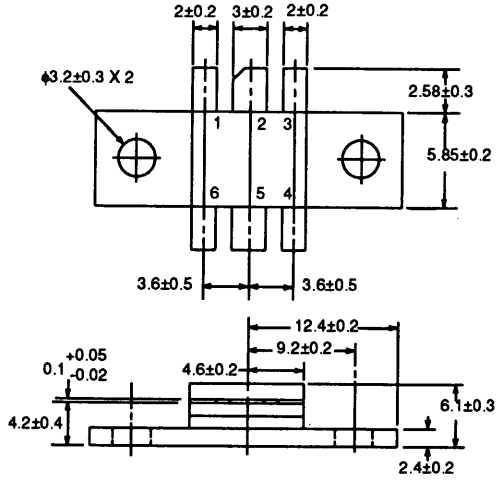


NEL132081-12
OUTPUT POWER AND COLLECTOR EFFICIENCY vs. INPUT POWER



OUTLINE DIMENSIONS (Units in mm)

PACKAGE OUTLINE 81



NEC

L-BAND POWER GaAs MESFET | NES1818-20B

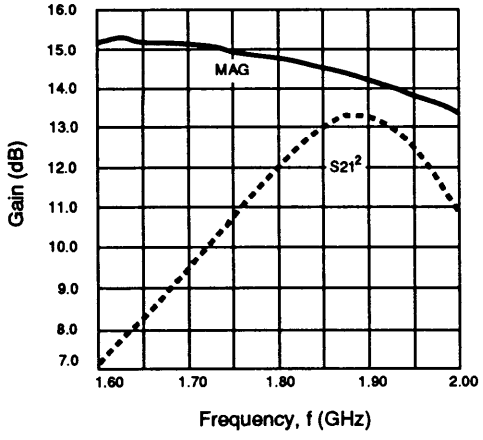
NOT RECOMMENDED FOR NEW DESIGN

PRELIMINARY

FEATURES

- **HIGH POUT**
  20 W (43.0 dBm) Typical P_{1dB}
- **HIGH EFFICIENCY**
  44% Power Added Efficiency
- **HIGH LINEAR GAIN**
  14 dB Typical Linear Gain
- **LOW IMD**
  -44 dBc @ 32 dBm (SCL)
- **CLASS A OPERATION**
- **PARTIAL INTERNAL MATCH**

S_{21}^2, MAG vs. FREQUENCY



DESCRIPTION

The NES1818-20B is a high performance microwave power GaAs FET which provides high output power, high gain, high efficiency and low intermodulation distortion. Its high Q matching network makes this device ideal for instantaneous bandwidths of 60 MHz or less in the 1.7 to 1.95 GHz range.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

PART NUMBER PACKAGE OUTLINE			NEZ1818-20B T40			
SYMBOLS	**CHARACTERISTICS**	**UNITS**	**MIN**	**TYP**	**MAX**	**TEST CONDITIONS**
P_{1dB}	Output Power at P_{1dB}[1] I_D = 4.0 A, RF Off	dBm	42.5	43		V_{DS} = 10 V 1.8 GHz I_D = 4.0 A (RF Off)
η_{ADD}	Power Added Efficiency @ P_{1dB}	%		44		
I_{DS}	Drain Current at P_{1dB}	A		4.4	6	
G_L	Linear Gain	dB	13	14		
IM_3	3rd Order Intermodulation Distortion at P_{OUT} = 32 dBm (SCL)[2]	dBc		-44		V_{DS} = 10 V f_1 = 1.799GHz f_2 = 1.800 GHz
I_{DSS}	Saturated Drain Current, V_{GS} = 0 V	A	8	14	18	V_{DS} = 1.5 V
V_P	Pinch-off Voltage, I_{DS} = 60 mA	V	-5.0	-3.5	-1.5	V_{DS} = 2.5 V
g_m	Transconductance I_{DS} = 4 A	mS		4000		
$R_{TH(CH-C)}$	Thermal Resistance, Channel to Case	°C/W	1.2	1.5		

Notes:
1. P_{1dB}: Output power at the 1 dB Gain Compression Point
2. SCL: Single Carrier Level

ABSOLUTE MAXIMUM RATINGS[1] (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V_{DS}	Drain to Source Voltage	V	15
V_{GS}	Gate to Source Voltage	V	-7
V_{GD}	Gate to Drain Voltage	V	-18
I_{DS}	Drain Current	A	I_{DSS}
I_{GRF}	Gate Current	mA	120
T_{CH}	Channel Temperature	°C	175
T_{STG}	Storage Temperature	°C	-65 to +175
P_T[2]	Total Power Dissipation	W	100

Note:
1. Operation in excess of any one of these parameters may result in permanent damage.
2. A thermal interface medium must be used between the bottom of the package and its mating surface to ensure optimum heat transfer. Each customer must choose the most appropriate method for his particular application (i.e. thermal grease, solder, etc.).

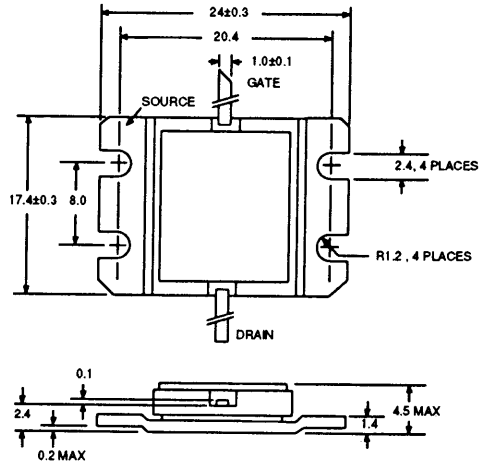
MAXIMUM OPERATING LIMITS

PART NUMBER	R_G MAX[1] Ω	I_{GRF} MAX mA	V_{DS} MAX V
NES1818-20B	50	20	10

Note:
1. R_G MAX is the maximum series resistance between the gate supply and the FET gate.

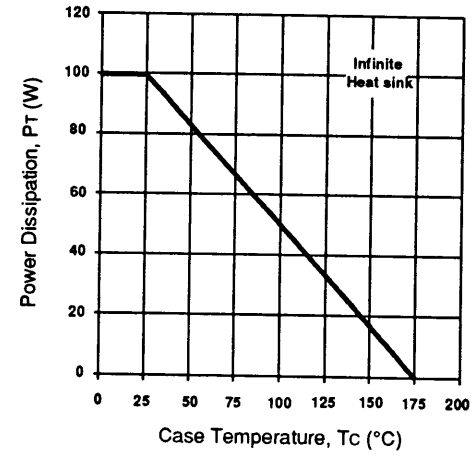
OUTLINE DIMENSIONS (Units in mm)

PACKAGE OUTLINE T40

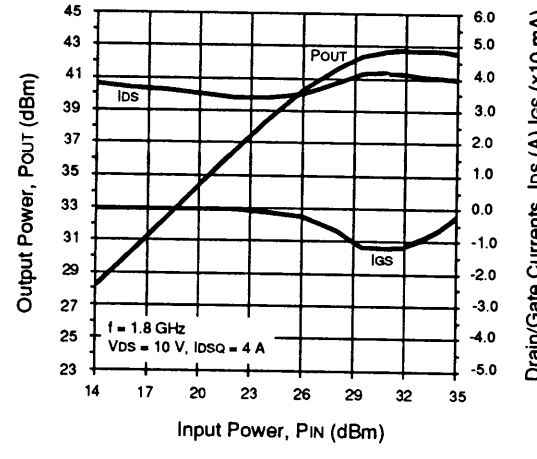


TYPICAL PERFORMANCE CURVES (T_A = 25°C)

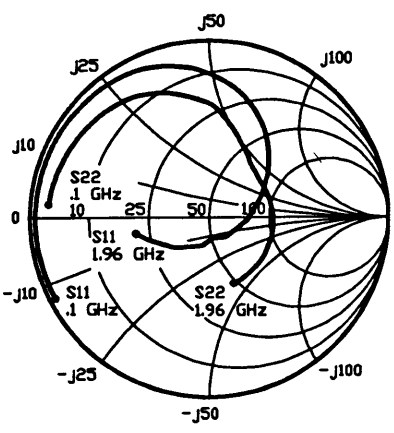
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE

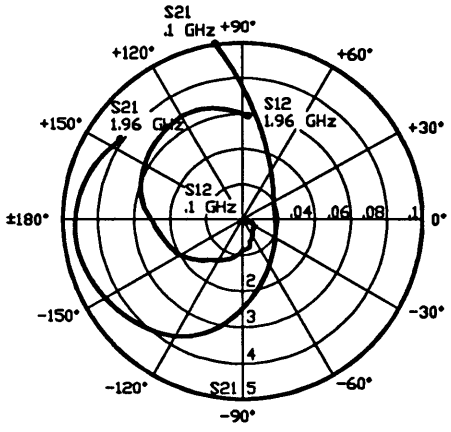


OUTPUT POWER, DRAIN AND GATE CURRENTS vs. INPUT POWER



SMALL SIGNAL COMMON SOURCE SCATTERING PARAMETERS (T_A = 25°C)





V_{DS} = 10 V, I_{DS} = 4 A

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}		K	S_{21}	MAG[1]
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		(dB)	(dB)
0.10	0.963	-152.1	5.174	98.9	0.002	10.5	0.893	175.3	0.659	14.2	34.1
0.20	0.964	-172.0	2.686	83.5	0.005	0.0	0.888	169.1	0.510	8.5	27.3
0.50	0.961	165.1	1.211	56.7	0.005	4.2	0.864	152.0	1.802	1.6	18.6
0.80	0.959	149.4	0.971	31.9	0.007	-21.6	0.836	134.7	1.729	-0.2	16.4
0.90	0.957	144.4	0.971	23.0	0.007	-34.0	0.820	128.0	1.849	-0.2	16.1
1.00	0.951	139.6	0.998	13.8	0.008	-43.3	0.802	121.4	1.873	-0.0	15.5
1.20	0.943	128.1	1.153	-7.8	0.011	-68.0	0.733	106.5	1.579	1.2	15.7
1.30	0.933	122.0	1.298	-20.2	0.014	-72.3	0.686	98.1	1.462	2.2	15.6
1.40	0.920	114.9	1.542	-33.7	0.015	-89.8	0.643	88.8	1.462	3.7	16.0
1.50	0.892	107.0	1.830	-51.2	0.019	-102.1	0.547	78.3	1.622	5.2	15.2
1.60	0.848	96.3	2.274	-70.5	0.026	-129.3	0.459	67.4	1.516	7.1	15.1
1.70	0.758	80.8	2.983	-95.4	0.038	-153.1	0.385	53.9	1.387	9.4	15.2
1.72	0.729	76.4	3.161	-101.5	0.040	-158.6	0.373	50.0	1.399	9.9	15.1
1.74	0.693	71.6	3.359	-107.7	0.042	-165.5	0.364	46.1	1.444	10.5	15.0
1.76	0.649	66.0	3.564	-114.4	0.045	-173.2	0.356	41.6	1.480	11.0	14.9
1.78	0.596	59.7	3.776	-121.9	0.048	178.9	0.350	36.3	1.483	11.5	14.8
1.80	0.534	52.8	4.006	-130.1	0.053	171.4	0.349	29.9	1.445	12.0	14.8
1.82	0.454	43.3	4.221	-138.8	0.057	162.0	0.348	21.6	1.452	12.5	14.7
1.84	0.360	31.4	4.403	-148.5	0.060	152.7	0.349	11.8	1.473	12.8	14.5
1.86	0.258	13.2	4.561	-158.7	0.063	142.3	0.354	0.4	1.482	13.1	14.4
1.88	0.167	-19.6	4.665	-169.4	0.065	130.8	0.360	-12.4	1.479	13.3	14.4
1.90	0.116	-80.7	4.642	179.4	0.067	118.9	0.364	-26.4	1.502	13.3	14.2
1.92	0.205	-127.0	4.525	167.9	0.066	108.9	0.374	-41.4	1.518	13.1	14.0
1.94	0.310	-152.7	4.335	156.7	0.063	98.5	0.382	-56.2	1.578	12.7	13.9
1.96	0.416	-168.1	4.085	146.3	0.059	87.3	0.392	-70.4	1.624	12.2	13.7

Note:
1. Gain Calculations:

$$MAG = \frac{|S_{21}|}{|S_{12}|}\left(K \pm \sqrt{K^2 - 1}\right)$$. When $K \le 1$, MAG = MSG. $$MSG = \frac{|S_{21}|}{|S_{12}|}$$, $$K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2\,|S_{12}S_{21}|}$$, $\Delta = S_{11}S_{22} - S_{21}S_{12}$

MAG = Maximum Available Gain
MSG = Maximum Stable Gain

NEC

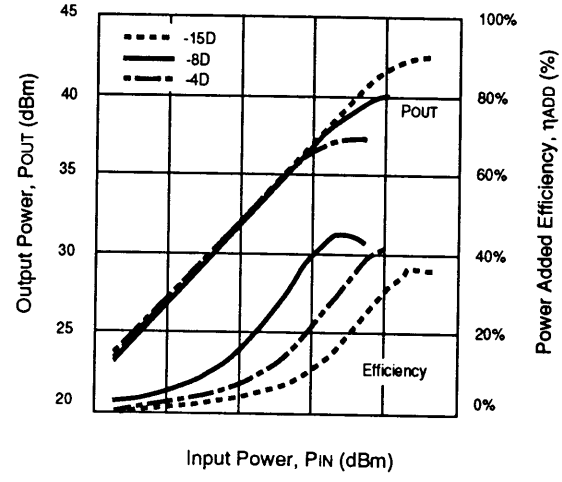
C-BAND POWER GaAs MESFET

NEZ4450-15D
NEZ4450-15DD
NEZ4450-8D
NEZ4450-8DD
NEZ4450-4D
NEZ4450-4DD

FEATURES

- **HIGH POUT**
  - 18W (42.5 dBm) Typ P_{1dB} for NEZ4450-15D/15DD
  - 9W (39.5 dBm) Typ P_{1dB} for NEZ4450-8D/8DD
  - 4.5W (36.5 dbm) Typ P_{1dB} for NEZ4450-4D/4DD
- **HIGH EFFICIENCY**
  - 40% ηadd for 4.5W Device
  - 38% ηadd for 9W Device
  - 37% ηadd for 18W Device
- **LOW IMD**
  - -45 dBc IM3 @ 31.5 dBm Pout (S.C.L.) -15DD
  - -45 dBc IM3 @ 29 dBm Pout (S.C.L.) -8DD
  - -45 dBc IM3 @ 26 dBm Pout (S.C.L.) -4DD
- **CLASS A OPERATION**
- **INTERNALLY MATCHED (IN/OUT)**
- **INDUSTRY COMPATIBLE HERMETIC PACKAGES**

OUTPUT POWER AND EFFICIENCY vs. INPUT POWER



ELECTRICAL CHARACTERISTICS (T_A = 25°C)

PART NUMBER / PACKAGE OUTLINE			NEZ4450-4D NEZ4450-4DD T-61			NEZ4450-8D NEZ4450-8DD T-61			NEZ4450-15D NEZ4450-15DD T-65			
SYMBOLS	**CHARACTERISTICS**	**UNITS**	**MIN**	**TYP**	**MAX**	**MIN**	**TYP**	**MAX**	**MIN**	**TYP**	**MAX**	**TEST CONDITIONS**
P_{1DB}	Output Power at P_{1dB}[1] I_D = 0.8A, RF Off I_D = 1.6A,RF Off I_D = 4.0A, RF Off	 dBm dBm dBm	35.5	36.5		38.5	39.5		41.5	42.5		V_{DS} = 10V f= 4.4 to 5.1 GHz
ηADD	Power Added Efficiency @ P_{1dB}	%		40			38			37		Zs = ZL =
I_{DS}	Drain Current at P_{1dB}	A		1.1	1.5		2.2	3.0		4.4	6.0	50 ohms
GL	Linear Gain	dB	9.5	10.5		9.5	10.5		9.0	10.0		
IM3	3rd Order Intermodulation[3] Distortion at Pout = 26 dBm SCL[2] Pout = 29 dBm SCL[2] Pout = 31.5 dBm SCL[2]	 dBc dBc dBc		-42	-45		-42	-45	42	-45		V_{DS} = 10V f_1 = 4.99GHz f_2 = 5.00 GHZ 2 Equal Tones
I_{DSS}	Saturated Drain Current V_{GS} = 0 V	A	1.0	2.3	3.5	2.0	4.5	7.0	4.0	9.2	14.0	V_{DS} = 2.5 V
VP	Pinch Off Voltage I_{DS} = 15mA I_{DS} = 30mA I_{DS} = 60mA	 V V V	-3.5	-2.0	-0.5	-4.0	-2.0	-0.5		-2.0	-0.5	
gm	Transconductance I_{DS} = IA I_{DS} = 2A I_{DS} = 4A	 mS mS mS		1300			2600			5200		
$R_{TH(CH-C)}$	Thermal Resistance Channel to Case	°C/W		5.0	6.0		2.5	3.0		1.3	1.5	

Notes
1. P_{1DB}: Ouptut Power at the 1dB Gain Compression Point
2. S.C.L.: Single Carrier Level
3. Minimum Spec Applies to -XDD Option Only

Alphanumeric Index

2 Power GaAs FETs

Bold = New Products
Δ = Not Recommended for New Design
* = Space Qualified

NEC

L-BAND POWER GaAs MESFET | NE345L-10B

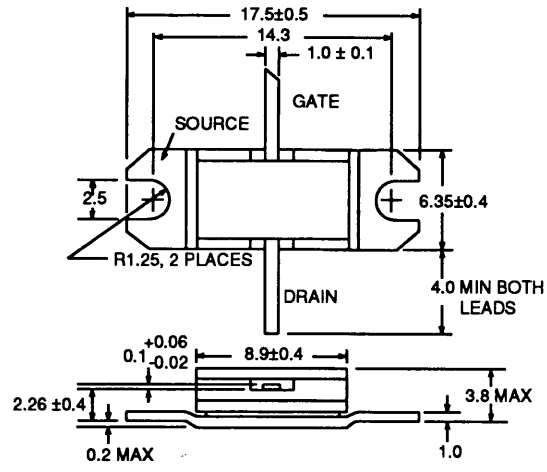
NOT RECOMMENDED FOR NEW DESIGN

NON PROMOTIVE

FEATURES

- **HIGH POUT**
  10 W (40.0 dBm) Typical P_{1dB}
- **HIGH EFFICIENCY**
  40% Power Added Efficiency at 1.6 GHz (η_{ADD})
  37% Power Added Efficiency at 2.3 GHz (η_{ADD})
- **HIGH LINEAR GAIN**
  9 dB Typical Linear Gain at 2.3
  12 dB Typical Linear Gain at 1.6 GHz
- **LOW IMD**
  -45 dBc Typical IM3 (29 dBm S.C.L.)
- **CLASS A OPERATION**

PACKAGE OUTLINE T38



DESCRIPTION

The NE345L-10B is a high performance microwave power GaAs FET which provides high output power, high gain, high efficiency and low intermodulation distortion. The device contains no internal matching network, making it suitable for either wide or narrow bandwidth power applications in UHF, L-Band and S-Band.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

PART NUMBER PACKAGE OUTLINE		NE345L-10B				
CHARACTERISTICS	**SYMBOLS**	**MIN**	**TYP**	**MAX**	**UNITS**	**TEST CONDITIONS**
Output Power at P_{1dB}[1] Power Added Efficiency @ P_{1dB} 2.3 GHz 1.6 GHz	P_{1dB} η_{ADD}	39	40 37 40		dBm %	V_{DS} = 10 V I_{DSQ} = 2.0 A (RF Off)
Drain Current at P_{1dB}	I_{DS}		2.3	3.0	A	
Linear Gain 2.3 GHz 1.6 GHz	G_L	8.0	9.0 12.0		dB	
3rd Order Intermodulation Estimated Distortion at P_{OUT} = 29 dBm (S.C.L.)[2]	IM_3		-45		dBc	V_{DS} = 10 V f_1 = 1.6 GHz f_2 = 1.6+0.01 GHz
Saturated Drain Current, V_{GS} = 0 V	I_{DSS}	5	7	9	A	V_{DS} = 1.5 V
Pinch-off Voltage, I_{DS} = 30 mA	V_P	-5.0	-3.5	-20	V	V_{DS} = 2.5 V
Transconductance I_{DS} = 2 A	g_m		2000		mS	
Thermal Resistance, Channel to Case	$R_{TH(CH-C)}$		2.3	3.0	°C/W	

Notes:
1. P1dB: Output Power at the 1 dB gain compression point.
2. S.C.L.: Single Carrier Level.

NEC

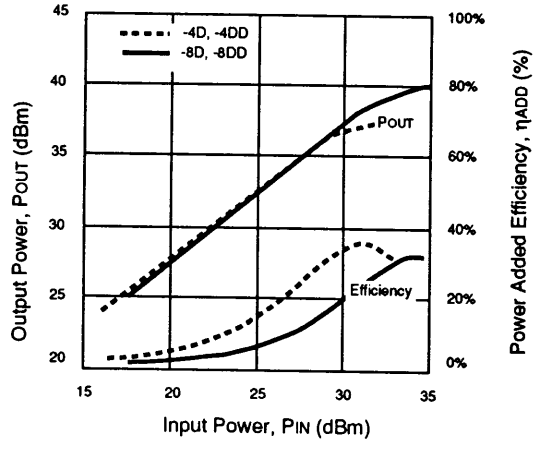
C-BAND POWER GaAs MESFET

NEZ7785-8D
NEZ7785-8DD
NEZ7785-4D
NEZ7785-4DD

FEATURES

- **HIGH POUT**
  9W (39.5 dBm) Typ P1dB for NEZ7785-8D/8DD
  4.5W (36.5 dbm) Typ P1dB for NEZ7785-4D/4DD
- **HIGH EFFICIENCY**
  33% ηADD for 4.5W Device
  31% ηADD for 9W Device
- **LOW IMD**
  -45 dBc IM3 @ 29 dBm POUT (SCL) -8DD
  -45 dBc IM3 @ 26 dBm POUT (SCL) -4DD
- **SiO_2 PASSIVATED CHIP**
  For Power/Gain Stability Under RF Overdrive
- **CLASS A OPERATION**
- **INTERNALLY MATCHED (IN/OUT)**
- **SUPERIOR GAIN FLATNESS**
- **INDUSTRY COMPATIBLE HERMETIC PACKAGES**

OUTPUT POWER AND EFFICIENCY vs. INPUT POWER



ELECTRICAL CHARACTERISTICS (TA = 25°C)

PART NUMBER / PACKAGE OUTLINE			NEZ7785-4D NEZ7785-4DD T-61			NEZ7785-8D NEZ7785-8DD T-61			
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX	TEST CONDITIONS
P1dB	Output Power at P1dB[1] IDSQ = 0.8A, (RF Off) IDSQ = 1.6A	 dBm dBm	35.5	36.5		 38.5	 39.5		VDS = 10V f = 7.7 to 8.5 GHz ZS = ZL = 50 Ω
ηADD	Power Added Efficiency @ P1dB	%		33			31		
IDS	Drain Current at P1dB	A		1.1	1.5		2.2	3.0	
GL	Linear Gain	dB	7.0	8.0		6.5	7.5		
ΔGL	Gain Flatness[3]	dB			±0.5			±0.5	VDS = l0V
IM3	3rd Order Intermodulation Distortion[3] at Pout = 26 dBm SCL[2] IDSQ = 0.8 A Pout = 29 dBm SCL[2] IDSQ = 1.6 A	 dBc dBc		-45	-42		 -45	 -42	f1 = 8.49 GHz f2 = 8.50 GHz 2 Tone Test
IDSS	Saturated Drain Current, VGS = 0 V	A	1.0	2.3	3.5	2.0	4.5	7.0	VDS = 2.5 V
VP	Pinch Off Voltage IDS = 15 mA IDS = 30 mA	 V V	-3.5	-2.0	-0.5	 -3.5	 -2.0	 -0.5	
gm	Transconductance IDS = I A IDS = 2 A	 mS mS		1300			 2600		
BVDGO	Drain - Gate Breakdown Voltage IDG = 15 mA IDG = 30 mA	 V V	20	22		 20	 22		
RTH(Ch-C)	Thermal Resistance (Channel to Case)	°C/W		5.0	6.0		2.5	3.0	

Notes
1. P1DB: Output Power at the 1dB Gain Compression Point.
2. SCL: Single Carrier Level.
3. Maximum Spec Applies to -XDD Option Only.

ABSOLUTE MAXIMUM RATINGS[1] (T_A = 25 °C)

SYMBOLS	PARAMETERS	UNITS	RATINGS	
			NEZ7785-4D/4DD	NEZ7785-8D/8DD
V_{DS}	Drain to Source Voltage	V	15	15
V_{GS}	Gate to Source Voltage	V	-12	-12
V_{GD}	Gate to Drain Voltage	V	-18	-18
I_{DS}	Drain Current	A	I_{DSS}	I_{DSS}
I_{GRF}	Gate Current	mA	25	50
T_{CH}	Channel Temperature	°C	175	175
T_{STG}	Storage Temperature	°C	-65 to +175	-65 to +175
P_T[2]	Total Power Dissipation	W	25	50

Note:
1. Operation in excess of any one of these parameters may result in permanent damage.
2. A thermal interface medium must be used between the bottom of the package and its mating surface to ensure optimum heat transfer. Each customer must choose the most appropriate method for his particular application (i.e. thermal grease, solder, etc.).

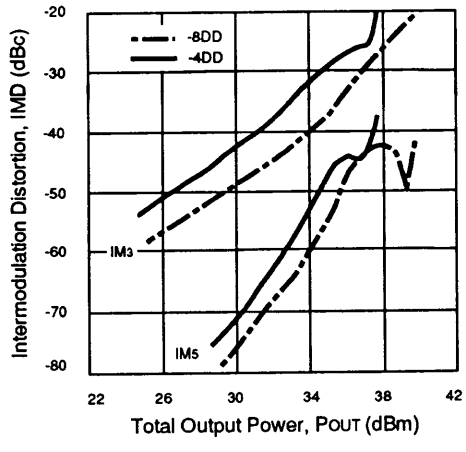
MAXIMUM OPERATING LIMITS

PART NUMBER	R_G MAX[1] Ω	I_{GRF} MAX mA	V_{DS} MAX V
NEZ7785-4D/4DD	200	5	10
NEZ7785-8D/8DD	100	10	10

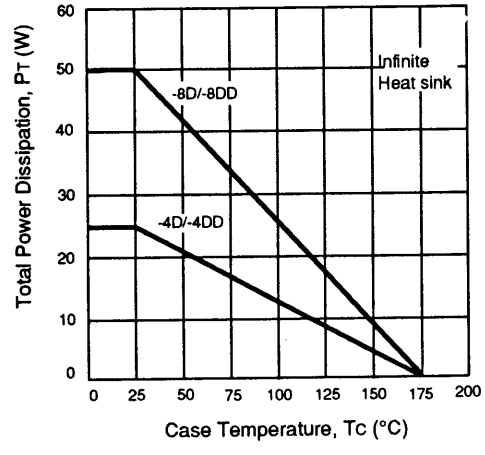
Note:
1. R_G MAX is the maximum recommended series resistance between the Gate Supply and the FET Gate.

TYPICAL PERFORMANCE CURVES (T_A = 25°C)

INTERMODULATION DISTORTION vs. OUTPUT POWER

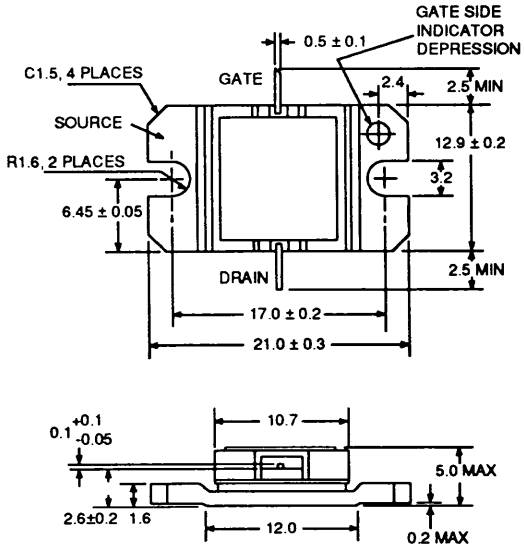


TOTAL POWER DISSIPATION vs. CASE TEMPERATURE

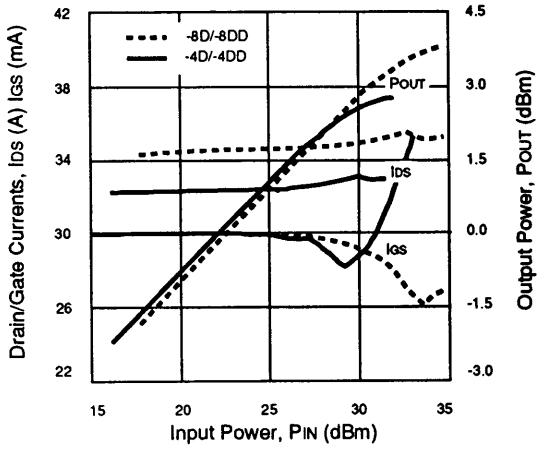


OUTLINE DIMENSIONS (Units in mm)

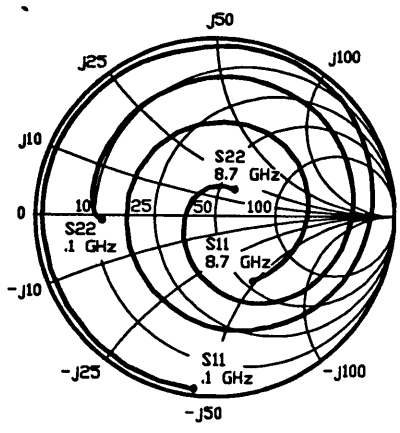
PACKAGE OUTLINE T-61

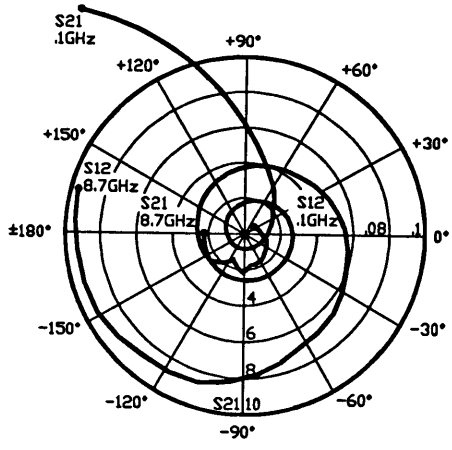


OUTPUT POWER, DRAIN AND GATE CURRENTS vs. INPUT POWER



TYPICAL SMALL SIGNAL SCATTERING PARAMETERS (TA = 25°C)





NEZ7785-4D/4DD
S-MAGN AND ANGLES:
VDS = 10.0 V, IDS = 800 mA

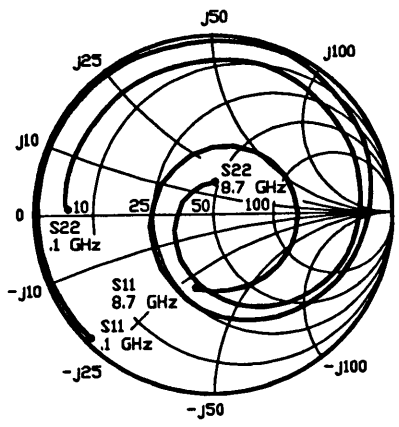
FREQUENCY	S11		S21		S12		S22		K	S21	MAG
GHz	MAG	ANGLE	MAG	ANGLE	MAG	ANGLE	MAG	ANGLE		(dB)	(dB)
0.1	0.960	-96.7	14.856	126.3	0.007	40.9	0.630	-177.3	0.18	23.4	33.2
0.2	0.957	-135.4	9.147	104.7	0.009	19.9	0.671	179.0	0.22	19.2	30.0
0.5	0.956	-174.0	4.012	74.3	0.010	3.8	0.693	168.6	0.50	12.0	26.0
1.0	0.958	159.5	2.093	42.6	0.011	-5.6	0.707	155.4	0.81	6.4	22.7
1.5	0.957	137.4	1.435	13.2	0.013	-11.0	0.714	141.0	1.04	3.1	19.1
2.0	0.955	119.1	1.118	-14.5	0.014	-24.9	0.739	125.8	1.10	0.9	17.0
2.5	0.942	101.0	0.940	-41.3	0.015	-39.7	0.753	109.6	1.47	-0.5	13.8
3.0	0.955	82.8	0.862	-67.2	0.017	-56.8	0.774	94.3	0.82	-1.2	17.0
3.5	0.963	63.3	0.837	-93.8	0.017	-77.7	0.790	79.0	0.44	-1.5	16.9
4.0	0.956	43.7	0.852	-121.5	0.021	-91.5	0.795	63.3	0.31	-1.3	16.0
4.5	0.914	25.0	0.868	-151.3	0.015	-113.4	0.807	45.7	1.54	-1.2	13.2
5.0	0.869	1.5	0.994	180.0	0.024	-144.1	0.793	27.8	1.23	-0.0	13.2
5.5	0.801	-26.8	1.222	147.2	0.028	161.3	0.775	7.9	1.58	1.7	11.9
6.0	0.689	-62.7	1.567	108.7	0.037	105.5	0.727	-14.7	1.98	3.9	10.5
6.5	0.559	-114.9	2.070	64.4	0.046	47.6	0.641	-41.3	2.18	6.3	10.3
6.7	0.515	-143.2	2.306	44.4	0.052	24.8	0.591	-53.1	2.07	7.2	10.5
6.9	0.490	-176.0	2.566	21.8	0.057	4.1	0.527	-67.0	1.95	8.1	10.9
7.1	0.495	149.6	2.710	-1.8	0.061	-19.0	0.456	-80.1	1.89	8.6	11.0
7.3	0.510	115.1	2.728	-26.7	0.067	-40.7	0.380	-94.4	1.81	8.7	10.8
7.5	0.527	85.0	2.680	-48.8	0.071	-63.5	0.312	-110.4	1.79	8.5	10.5
7.7	0.547	58.0	2.665	-71.1	0.079	-84.4	0.243	-129.8	1.65	8.5	10.5
7.9	0.544	33.6	2.598	-93.3	0.087	-107.1	0.187	-156.4	1.59	8.2	10.2
8.1	0.526	10.9	2.557	-114.8	0.089	-130.0	0.157	168.7	1.62	8.1	9.9
8.3	0.496	-11.7	2.479	-137.8	0.094	-151.8	0.151	123.7	1.64	7.8	9.5
8.5	0.456	-34.2	2.343	-159.7	0.095	-174.5	0.166	84.0	1.77	7.3	8.8
8.7	0.419	-59.8	2.277	179.9	0.098	164.9	0.180	54.3	1.82	7.1	8.4

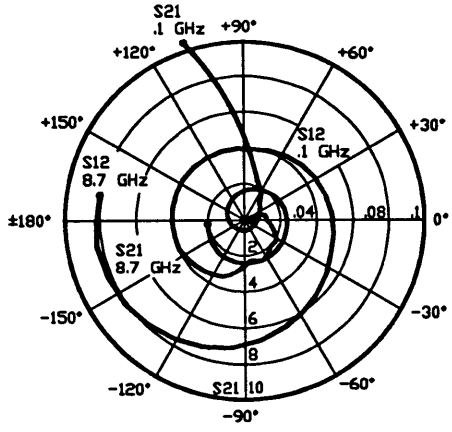
Note:
1. Gain Calculations:

$$MAG = \frac{|S_{21}|}{|S_{12}|}\left(K - \sqrt{K^2 - 1}\right)$$. When $K \le 1$, MAG = MSG. $$MSG = \frac{|S_{21}|}{|S_{12}|}$$, $$K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2\,S_{12}\,S_{21}}$$, $\Delta = S_{11}\,S_{22} - S_{21}\,S_{12}$

MAG = Maximum Available Gain
MSG = Maximum Stable Gain

TYPICAL SMALL SIGNAL SCATTERING PARAMETERS (T_A = 25°C)





NEZ7785-8D/8DD
S-MAGN AND ANGLES:
V_{DS} = 10.0 V, I_{DS} = 1600 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}		K	S_{21}	MAG
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		(dB)	(dB)
0.1	0.965	-134.9	10.517	108.5	0.004	11.1	0.802	178.3	0.12	20.4	34.1
0.2	0.971	-160.1	5.614	94.0	0.006	18.7	0.823	176.2	0.38	14.9	29.7
0.5	0.976	175.6	2.333	72.4	0.007	19.2	0.832	167.3	0.71	7.3	25.2
1.0	0.978	155.2	1.222	46.4	0.009	18.7	0.833	154.9	0.95	1.7	21.3
1.5	0.974	136.0	0.861	20.4	0.012	12.3	0.830	141.2	1.12	-1.3	16.4
2.0	0.970	119.2	0.692	-4.1	0.013	-2.3	0.841	127.0	1.21	-3.1	14.4
2.5	0.958	102.0	0.604	-28.3	0.017	-18.9	0.843	112.5	1.28	-4.3	12.3
3.0	0.966	83.9	0.576	-52.1	0.021	-30.6	0.847	98.9	0.85	-4.7	14.3
3.5	0.979	64.2	0.580	-77.3	0.021	-47.0	0.858	85.3	0.40	-4.7	14.4
4.0	0.949	45.6	0.590	-106.7	0.025	-64.9	0.872	72.6	0.53	-4.5	13.7
4.5	0.927	24.2	0.642	-133.2	0.023	-82.0	0.866	57.2	0.83	-3.8	14.4
5.0	0.865	-0.2	0.757	-161.6	0.034	-110.7	0.853	41.6	0.83	-2.4	13.4
5.5	0.781	-28.9	0.955	165.9	0.040	-156.0	0.848	24.6	0.81	-0.4	13.7
6.0	0.644	-65.4	1.256	127.0	0.041	147.0	0.824	5.9	1.37	1.9	11.2
6.5	0.456	-118.8	1.686	82.5	0.040	81.4	0.779	-16.8	2.16	4.5	10.1
6.7	0.382	-149.5	1.883	62.4	0.043	56.0	0.747	-26.7	2.25	5.4	10.1
6.9	0.335	171.1	2.103	40.0	0.046	32.0	0.698	-38.0	2.28	6.4	10.2
7.1	0.331	129.4	2.268	17.0	0.049	3.6	0.651	-48.8	2.25	7.1	10.3
7.3	0.370	90.1	2.368	-7.1	0.052	-22.0	0.586	-61.5	2.24	7.4	10.2
7.5	0.416	55.7	2.412	-31.4	0.058	-46.3	0.519	-75.3	2.11	7.6	10.1
7.7	0.452	27.0	2.440	-55.1	0.064	-69.1	0.440	-91.6	2.03	7.7	10.0
7.9	0.470	0.1	2.408	-79.4	0.072	-95.9	0.355	-112.1	1.97	7.6	9.5
8.1	0.469	-25.8	2.375	-103.0	0.077	-120.6	0.272	-138.9	2.00	7.5	9.1
8.3	0.451	-51.7	2.307	-127.7	0.082	-144.7	0.199	-177.0	2.05	7.2	8.6
8.5	0.431	-77.8	2.140	-152.2	0.084	-169.9	0.170	132.2	2.21	6.6	7.8
8.7	0.424	-103.6	2.003	-174.2	0.082	170.0	0.176	86.9	2.42	6.0	7.2

Note:

1. Gain Calculations:

$$MAG = \frac{|S_{21}|}{|S_{12}|}\left(K - \sqrt{K^2 - 1}\right)$$. When $K \le 1$, MAG = MSG. $$MSG = \frac{|S_{21}|}{|S_{12}|}$$, $$K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2\,S_{12}\,S_{21}}$$, $\Delta = S_{11}S_{22} - S_{21}S_{12}$

MAG = Maximum Available Gain
MSG = Maximum Stable Gain